first-ever measurement of the dimming of a star (HD 209458) because of the passage of an orbiting planet occurred in late 1999. This "extrasolar planetary transit" was discovered independently by two groups and widely reported in the news media.

Soon after the announcement, Ames conducted an archival search of the brightness data of the star HD 209458. The data, collected by the European Hipparcos satellite between 1989 and 1992, revealed a photometric dimming consistent with the observed radial-velocity measurements and ground-based transit observations. The long baseline in time between the Hipparcos measurements and the present allowed a precise determination of the orbital period of the planet. These results will be published in the *Astrophysical Journal Letters*. The successful confirmation of an extrasolar planetary transit in the Hipparcos data suggests that it may be possible to discover more extrasolar planets around sun-like stars using data from the Hipparcos satellite or NASA's planned Full Sky Astrometric Explorer (FAME) satellite.

A novel method for obtaining high-precision photometric measurements of bright stars using a spot filter and charge coupled device detectors on ground-based telescopes has been developed. A demonstration of the technique was performed on the sun-like star HD 187123 in the fall of 1999. Athough no transit of an extrasolar planet was seen, the required precision was achieved, as shown in figure 1. Additional observations were made of the stars bearing extrasolar planets HD 217107, 51 Pegasi, Upsilon Andromedae, and Tau Bootes, without result.

Point of Contact: T. Castellano
(650) 604-4716
tcastellano@mail.arc.nasa.gov

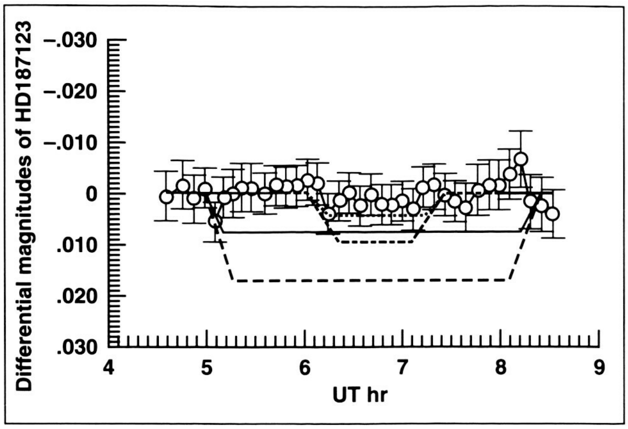

Fig. 1. A sample of data for the star HD 187123 compared to a range of simulated possible transit signals produced by Jupiter-like planets passing in front of a solar-like star.

Composition of Dust Along the Line of Sight Toward the Galactic Center

Jean Chiar, Alexander Tielens, Douglas Whittet

The composition of dust and ice along the line of sight to the galactic center (GC) has been investigated through analysis of midinfrared spectra (2-13 microns) from the Short Wavelength Spectrometer on the Infrared Space Observatory (ISO). The path to the GC samples both diffuse interstellar matter and dense molecular cloud environments by performing a phenomenological comparison with well-studied sightlines known to sample these distinct environments. We have been able to separate spectral absorption features arising in these components toward the GC. Dust absorption features along the lines of sight toward Sagittarius A* (Sgr A*) and the Quintuplet sources (GCS3 and GCS4) are the primary targets in this endeavor. Molecular cloud material is unevenly distributed across the GC. Measurements of absorption features due to abundant solid-state species, such as water/ice and carbon dioxide, reveal that there is more molecular cloud material along the line of sight toward Sgr A* than toward the Quintuplet sources. The Sgr A* sightline has a rich, solid-state infrared spectrum that also reveals strong evidence for the presence of solid methane, ammonia, and formic acid in the molecular cloud ices.

Hydrocarbon dust in the diffuse interstellar medium along the line of sight to the GC is characterized by absorption features centered at 3.4, 6.8, and 7.3 microns. Ground-based studies have identified the 3.4-micron feature with the C-H stretch vibration mode of aliphatic (chain-like) hydrocarbons. Prevailing theories regarding the production of this robust organic interstellar grain component assume energetic processing of simple interstellar ices (water, carbon monoxide, methane, and ammonia) present in dense molecular clouds. ISO observations have provided the first meaningful observations of the corresponding modes of these hydrocarbons at longer wavelengths, enabling us to rule out some laboratory analogs and, therefore, the production routes of these organics. The integrated strengths of the three observed absorption features suggest that some form of hydrogenated amorphous carbon (HAC), rather than processed ices, may be their carrier. Figure 1 shows an impressive match to the observed absorption features with a HAC produced in the laboratory by Douglas Furton (Rhode Island College). An absorption feature that is centered at 3.28 microns in the GCS3 spectrum is attributed to the C-H stretch of aromatic (ring-like) hydrocarbons. Since this was the only feature detected, as well as its C-C stretch counterpart (at 6.2 microns), toward the Quintuplet region, but not toward Sgr A*, one of the key questions that now arises is whether aromatic hydrocarbons are a widespread component of the general diffuse interstellar medium, analogous to aliphatic hydrocarbons.

Point of Contact: J. Chiar
(650) 604-0324
chiar@misty.arc.nasa.gov

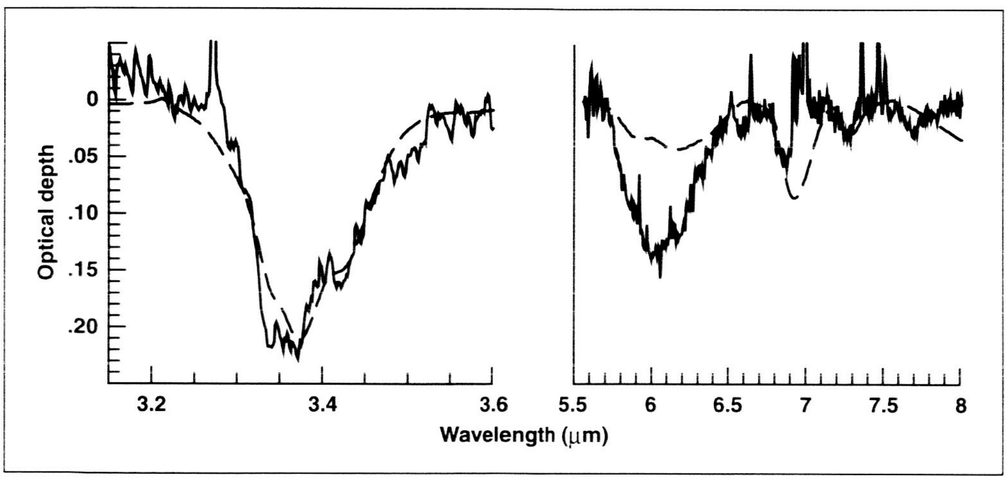

Fig. 1. Midinfrared spectrum of Sagittarius A (solid line) compared with a laboratory HAC analog from Furton (dashed line). The HAC spectrum is representative of the interstellar absorption features at 3.4, 6.8, and 7.3 microns.*